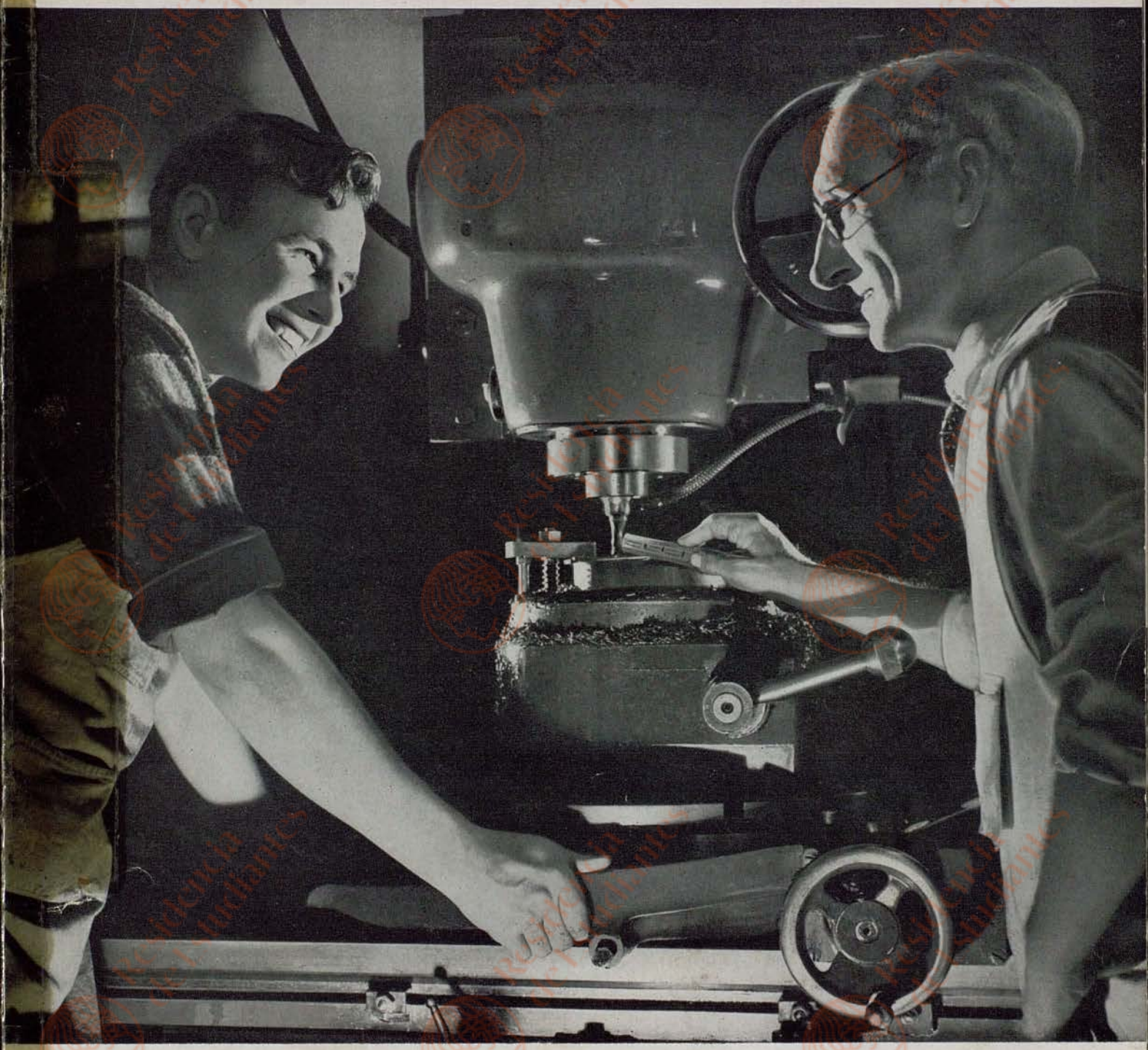
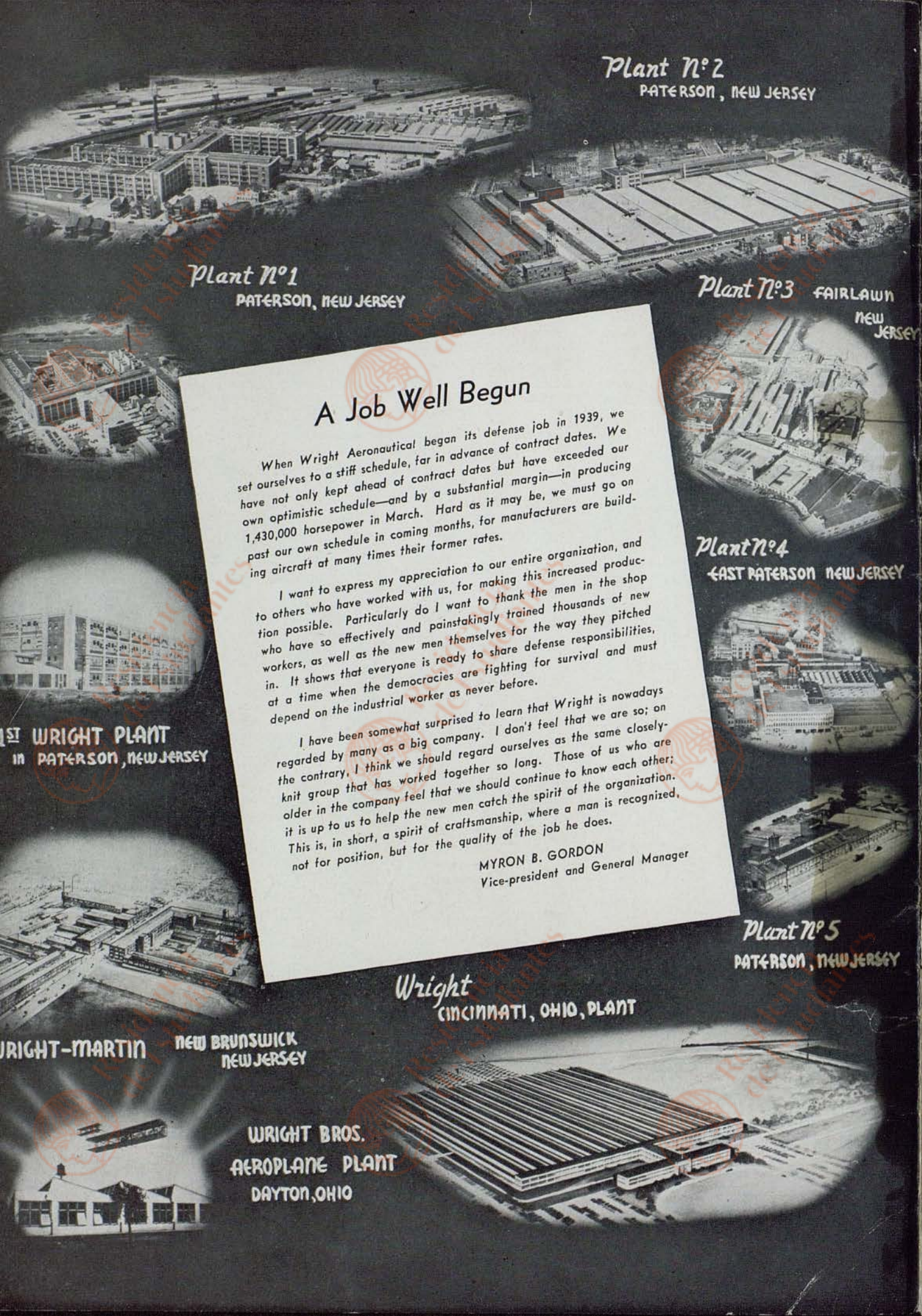
APRIL 1941

Trade Winds



WRIGHT AERONAUTICAL CORPORATION



A Job Well Begun

When Wright Aeronautical began its defense job in 1939, we set ourselves to a stiff schedule, far in advance of contract dates. We have not only kept ahead of contract dates but have exceeded our own optimistic schedule—and by a substantial margin—in producing 1,430,000 horsepower in March. Hard as it may be, we must go on past our own schedule in coming months, for manufacturers are building aircraft at many times their former rates.

I want to express my appreciation to our entire organization, and to others who have worked with us, for making this increased production possible. Particularly do I want to thank the men in the shop who have so effectively and painstakingly trained thousands of new workers, as well as the new men themselves for the way they pitched in. It shows that everyone is ready to share defense responsibilities, at a time when the democracies are fighting for survival and must depend on the industrial worker as never before.

I have been somewhat surprised to learn that Wright is nowadays regarded by many as a big company. I don't feel that we are so; on the contrary, I think we should regard ourselves as the same closely-knit group that has worked together so long. Those of us who are older in the company feel that we should continue to know each other; it is up to us to help the new men catch the spirit of the organization. This is, in short, a spirit of craftsmanship, where a man is recognized, not for position, but for the quality of the job he does.

MYRON B. GORDON
Vice-president and General Manager

30,000 Workers in 6 Wright Plants To Build 3,780,000 h. p. Monthly

IN the eighteen months since Danzig was shelled to start World War II, the Wright Aeronautical Corporation has increased its aircraft engine output 550 percent—from 264,720 horsepower monthly to a current monthly figure of 1,430,000 horsepower. In achieving this new monthly high output of Cyclone and Whirlwind aircraft engines, Wright surpassed the projected production program scheduled last May with National Defense authorities.

By July of this year, the Paterson plants are scheduled to reach a maximum output of about 1,780,000 horsepower monthly, or 650 percent of the normal maximum of September, 1939. By July of 1942 the new Cincinnati division will add another 2,000,000 horsepower for a grand total of 3,780,000 h. p. in all six plants.

From One to Six Plants

To house this record operation, the company has already spread from one plant of 900,000 square feet to five New Jersey plants totaling 2,856,900 square feet in area. The Ohio plant increases the total to 4,976,900 square feet.

Indicative of Wright Aeronautical's speed in replying to national defense demands is the modern steel, brick and glass Plant No. 2 in Paterson. It has 520,000 square feet under one roof and went into production 57 working days after ground was broken for the foundation.

Largest of Its Kind

The Cincinnati plant is the largest single-story building in America and naturally dwarfs any other building of the company. Inside the plant, the 16 major league baseball teams could play eight games simultaneously on full-sized diamonds, with 30,000 fans in the grandstand at each game. Enough space would be left over to run off a college football game on a regular gridiron before 25,000 spectators.

In the face of nation-wide demand for skilled personnel, Wright Aeronautical solved the administrative and training problem of enlarging its force in Paterson from 5,175 persons in 1939 to more than 16,000 to

COMPANY TRAINED WORKER operating one of the automatic machines which have helped Wright Aeronautical Corporation increase its production 550 percent in 18 months.

WRIGHT ASSEMBLERS working in the new type of progressive assembly line established by the company to increase output. One engine can be put out every 25 minutes.

OPERATORS USING fastematic turret lathes to machine the inside and outside surfaces of crankcase sections.

SINGLE PURPOSE MULTIPLE SPINDLE MACHINE drilling holes for studs. Each one of these drills replaces an operation formerly done by a single machine.

date and to more than 17,000 two months hence. Thirty-five hundred of the men now at work, or more than half of the new machine operators, came into the plant as learners in the Wright Aeronautical training program. This system of training is being duplicated in Cincinnati where the company will build up a personnel of more than 12,000 persons. In the skilled and semi-skilled class, there will be 4,500 machine shop workers, 2,500 machine hands, 500 inspection personnel and 1,600 assembly and test personnel.

The engines turned out in September of 1939 averaged 960 horsepower. They were stepped up by January of this year to an average of 1,280 horsepower per engine and the average will exceed 1,500 horsepower by June of 1942.

80,000 Machine Operations

Into a Cyclone 14 go 8,500 separate parts, requiring over 80,000 machine operations and 50,000 inspections. Completed, the Cyclone 14 is a 1,700 h. p. engine with a flight life of 2,000,000 miles.

New production layouts have had to be established speedily and complete new tooling designed without loss of time. The "in-line" principle of mass production and newly designed multiple-tooling machinery has made it possible for Wright Aeronautical to increase its output five and a half times while floor

space was being expanded only three and a half times and man-power tripled.

Breaking up the customary grouping of similar machines, production experts have now arranged most of the equipment so that parts progress directly from one operation to the next. Assembly lines have been redesigned to assemble engines progressively; one being assembled every 25 minutes. Improved equipment and tooling, instead of duplication of existing machining processes, was principally responsible for the production increase.

Machinery Improved

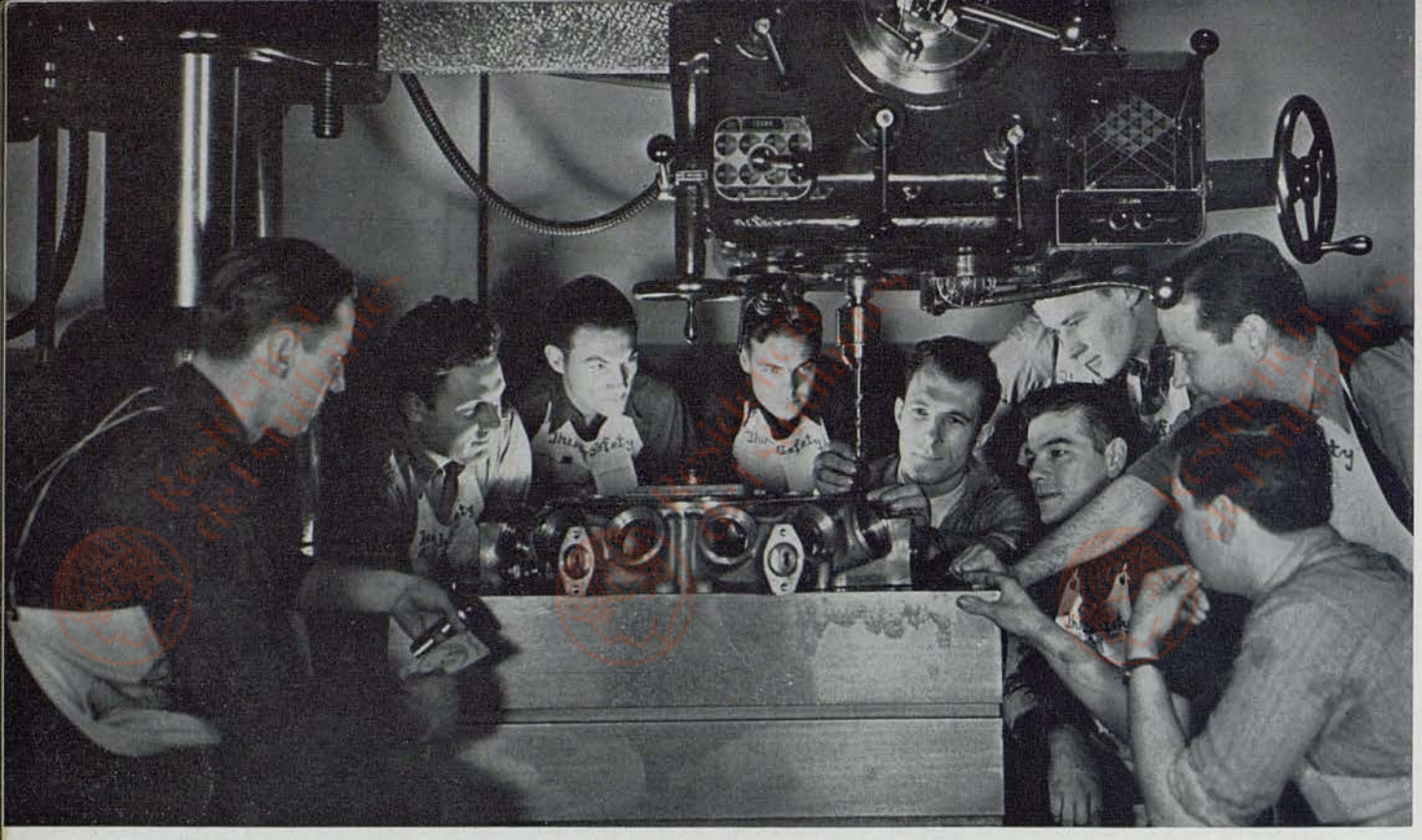
Confronted with a scarcity of skilled labor, Wright was forced to build skill into machines and tooling, so that semi-skilled operators could be employed. Although much of the equipment is consequently single-purpose, multiple-tooling has been provided so that several surfaces are cut at once. Much of this machinery is automatic and the operator only has to insert and remove the parts. For example, one new machine simultaneously bores two holes in each of five cylinder heads. It replaces 12 single-purpose machines and reduces the working time from 26 minutes to two minutes for the operation.

Machines 14 feet high and weighing 15 tons bore out five cylinder barrels at once, cutting the operating time from 22 to 7½ minutes.

In addition to the parts produced by its own men, Wright is purchasing parts each month that require the work of from 18,000 to 20,000 men in the plants of over 250 companies. The purchases are six times those of 1939. Where the company previously bought less than 15 percent of the finished parts for its engines—not including accessories—it is expected to purchase 55 percent for the output of the Cincinnati plant. These purchased parts include master rods and articulated rods, pistons, rocker arms, propeller shafts, steel crankcases and crankshafts. The Cincinnati plant will manufacture shafts, gears, pinion gears, sleeves, reduction gears and cams, aluminum crankcase sections, supercharger covers, cylinder barrels and cylinder heads.

THIS MAN IS RUNNING a continuous operation machine for spot facing, drilling, reaming and tappeting the two spark plug holes in cylinder heads.

BATTERY OF "MULT-AU-MATIC" machines for turning, facing and boring Cyclone cylinder barrels. Weighing 15 tons these 14' machines each replace several single-purpose machines.



THE TECHNIQUE OF RADIAL DRILL OPERATION is being shown these trainees in a vocational school operated by the Wright Aeronautical Corporation. These young men are inspecting the drill after the holes have been made for the studs which connect the supercharger front section to the crankcase of a Wright Cyclone 14 aircraft engine. Through these vocational schools Wright Aeronautical has succeeded in training thousands of men for skilled and semi-skilled jobs in the National Defense program.

Wright Training Fourth of Men Needed In Industry; Veterans Pass Along Skill to Young Men at Machines

STARTING an expansion program in 1939 which was to increase plant facilities 550 per cent, Wright Aeronautical Corporation faced the problem of bringing its personnel up to nearly 30,000 persons, at a time when the labor market was fast being drained of men skilled in the precision work of aircraft engine production.

It was an emergency situation, just as much so as the pressing need for constructing additional plants and buying more machine tools, but Wright Aeronautical was ready to meet the emergency. Skilled and semi-skilled machinists were needed —office workers and unskilled labor were available—and to provide them Wright Aeronautical quickly put into action on a much larger scale the training program that it had founded years before. It was the thorough work of this system that put 2,700 new machine operators in the five Paterson plants last year.

Altogether more than half of the new men employed as machine operators, about 3,500 men in all, came into the plant as learners in the Wright Aeronautical training program. This same system is now at work in Ohio and will supply trained workers on schedule as the Cincinnati plant personnel eventually rises to 12,000 persons turning out 1,000 Wright Cyclone 14-cylinder engines a month.

Originated By Whiteside

Bartley Whiteside, supervisor of training, was the man who originated this training system back in 1936, long before war clouds rolled up over Europe. Commercial aviation all over the world was showing a steady growth in the middle of the past decade. Normal increases in production volumes made more men necessary. But the company was discovering that those men were hard to find, despite the millions unemployed.

Mr. Whiteside knew that the majority of young men coming out of school and looking for jobs had academic backgrounds and little vocational training. The apprentice system was at a low ebb in the depression and post-depression years. And he could foresee that industry could never depend again on the old system of advertising for men to fill vacant jobs.

With the cooperation of P. W. Brown, assistant works manager, the Paterson Vocational School and the State employment service, he set up the system which proved its merits by meeting all of the current expansion tests.

In order to set up a teaching personnel in the plant, 18 supervisors from all divisions of the company were selected as conference leaders

and given intensive pedagogical work for foremen training courses. The next step was to pass on to the foremen the most up-to-date methods of vocational teaching, since the foremen were to give the instruction directly to the learners.

More than 200 meetings between conference leaders and foremen were held, teaching the foremen the fastest and most efficient methods of showing a green man the "how" of a machine. Every step in teaching operation of a machine was made standard.

Fourth of An Industry

These conferences were highly important in the success of the Wright program. Characterized by defense training leaders as the outstanding program among defense industries, it is estimated that the Wright program will have supplied a fourth of the men needed for the entire aircraft engine manufacturing industry up to the end of this year.

When a certain type of operator is needed, "Man Specifications"—such as height, weight, physical condition and education—are set by the employer. Young men who fit these specifications are picked and start their training.

Young Man in the Twenties

The typical learner coming to Wright is a healthy young man, usually in his early twenties, with a high school education, a good deal of mechanical ability and a great deal more mechanical interest. Wright Aeronautical was fortunate in that many of the young men to be trained in Cincinnati came from areas where machine tool ability is a family trait. He is, in every case, an American citizen.

First of all, he registers with the State Employment Service, to comply with the Federal law that permits the U. S. Office of Education to pay instructors and to meet some of the expenses of training courses. He is given psychological tests to determine intelligence and adaptability. Then he goes to school for a week, a school that teaches shop arithmetic, shop science, reading of operating sheets and use of measuring tools. It is a school that weeds out most

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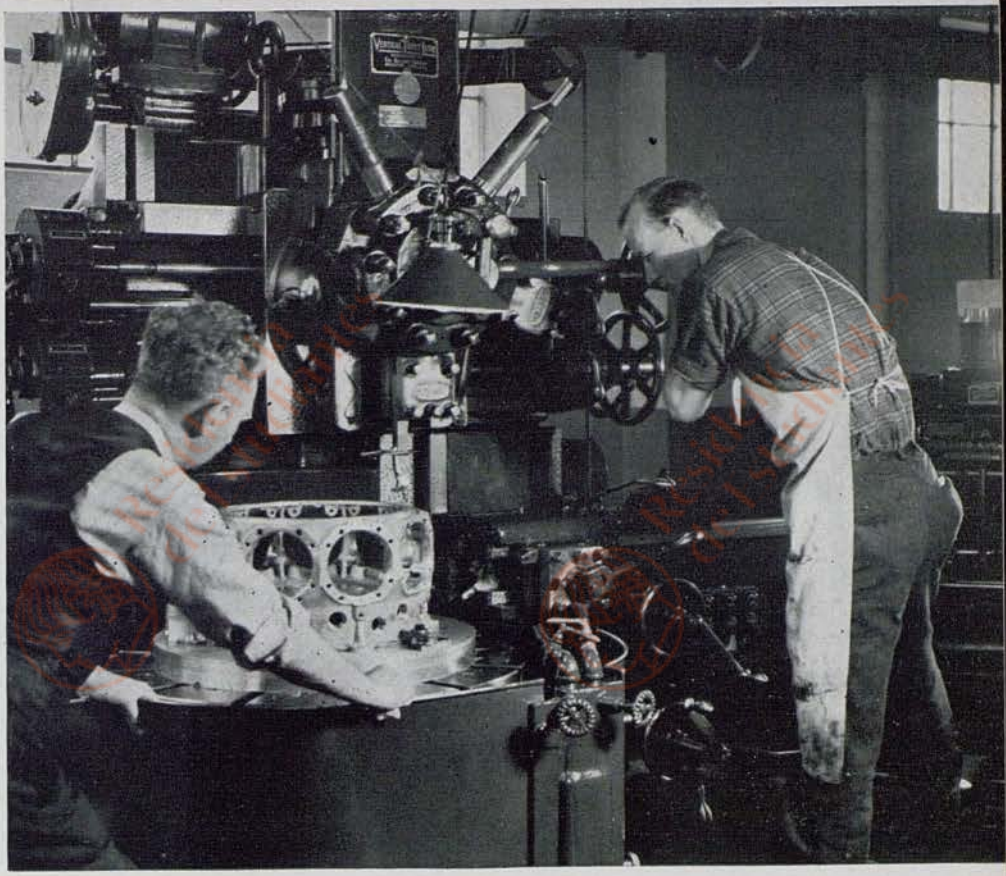


A LEARNER HAS TO MASTER THE ART of using both hands and feet to operate this vertical turret lathe. He is being instructed in the art of using three foot lever controls.

THESE TRAINEES are watching intently as a learner receives instruction on a radial drill, shown here as it drills and reams valve guide holes in a Cyclone cylinder head.

THE RIGHT HONORABLE LORD MARLEY is shown shaking hands with Myron B. Gordon, Vice-President and General Manager of Wright Aeronautical, after M. F. Gemme, (left), chairman of the "Buck for Britain" campaign presented two Wright Cyclone 14 engines to the Bristol Aeroplane Company in behalf of the 16,000 Wright employees. H. E. Linsley, another committee member is shown at the right.

Lord Beaverbrook, Minister of Aircraft Production, Sends Cablegram of Appreciation for Two Cyclone 14's

LORD Beaverbrook, Minister of Aircraft Production for Great Britain, last week cabled his thanks to M. F. Gemme, Assembly Superintendent, for the two Wright Cyclone 14's purchased through employee contributions and sent overseas. Mr. Gemme was chairman of the "Buck for Britain" campaign conducted throughout Wright Aeronautical Corporation.

"Will you please convey to your colleagues of Wright Aeronautical Corporation the deep gratitude we feel for the gift of two Wright Cyclone engines which they made," Lord Beaverbrook wired M. F. Gemme, Assembly Superintendent, chairman of the "Buck for Britain" campaign.

"These famous motors provide the power for the Stirling Bomber which will strike even heavier blows at the heart of Hitler's war machine. In manufacturing them you play a vital part in the battle of freedom. In giving them you disclose a generous comradeship which touches the hearts of our people now holding the front line with resolute faith in victory."

The engines were presented to the Bristol Aeroplane Company, as an international gesture of goodwill at ceremonies held in the assembly department of the main plant February 28. The Right Honorable Lord Marley, representing employees of the Bristol Company, accepted the Cyclones in behalf of Bob Williams, oldest worker at the Bristol plant.

Assembly Workers Participate

The entire assembly department watched the presentation as news photographers and a newsreel cameraman recorded the event. Mr. Gemme, acting in behalf of his committee, turned over the two engines to Lord Marley after Mr. Gordon acting for the Wright Aeronautical Corporation had completed the transfer of the engines to Mr. Gemme.

Preceding the ceremonies in the assembly department, a luncheon was held at the Hamilton Club which was attended by the committee of Wright workers, company officials and Lord Marley.

At the luncheon Lord Marley expressed the appreciation of the Bristol employees.

Shortly afterward, the engines were shipped to England where Mr. Williams instructed that they be placed in a Stirling bomber.

Assisting Mr. Gemme in the drive for contributions were the following members of the independent committee of employees: Horace Linsley, Frank Miller, Eric Preece, S. J. Sharpley, Melvin Storz, Jean Smith, M. W. Taylor and Reed Freeman.

50-Acre Cincinnati Plant Ready To Produce Engines; Was Used As Model In Setting Up Defense Sytem

ON Memorial Day of last year, executives of the Wright Aeronautical Corporation met with industrial leaders in Washington at the request of Secretary of the Treasury Henry Morgenthau, Jr., to discuss the extension of manufacturing facilities for National Defense. The expansion was to be coordinated by the newly-formed National Defense Advisory Commission headed by William Knudsen, who had resigned his position as President of General Motors to take the defense post.

Plan Presented in 5 Days

Five days after the Government leaders had asked in general terms for the production of more aircraft engines, Wright presented a complete and detailed expansion plan for production far in excess of normal peace-time rates. It was the first plan that called for the construction by a major manufacturer of a completely new plant. Although it had not been situated then, this plant was to become the Cincinnati division of the Wright Aeronautical Corporation, the largest single story building in the world.

First to be ready with a comprehensive expansion plan, Wright became the guinea-pig in establishing the legal and financial procedures which were later to be followed by other industries turning out National Defense materials. Using Wright as a model, high defense officials worked out agreements to speed defense materials to the various branchs of the nation's armed forces. Financial, military and civil procedures were worked out for the Wright plan and followed in other industrial expansions.

While these developments were taking place in Washington, R. F. Gagg, Assistant to the General Manager, searched the Middle West and the Mississippi Valley states for a site offering the best combination of population with an industrial background, accessibility to transportation, and sources of fuel, power and water. He was searching for a site that would fit into the National Defense plan of locating vital industries in the inter-mountain area between the Alleghenies and the Rockies, out of the range of possible enemy bombers. On August 21 after an exhaustive survey had been made by Mr. Gagg, it was publicly announced that Cincinnati was the most desirable place.

Tooling System Evolved

Simultaneously, P. W. Brown, Assistant Works Manager, started the task of specifying the design of machine tools for the mass production of engines. A new tooling system was set up and on August 22, 1940, an order for $8,000,000 of machine tools was placed. This order was followed by others, for all of the tools, in September.

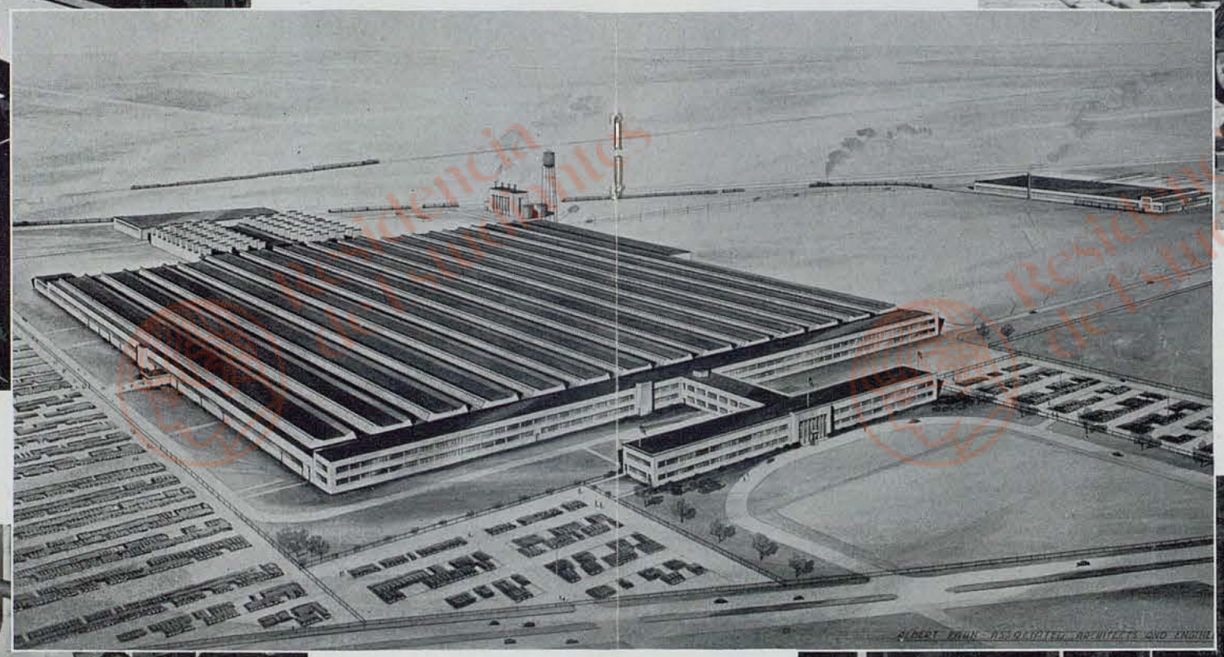
An important day was October 23, 1940, when Guy W. Vaughan, Presi-

(Continued on Page 16)

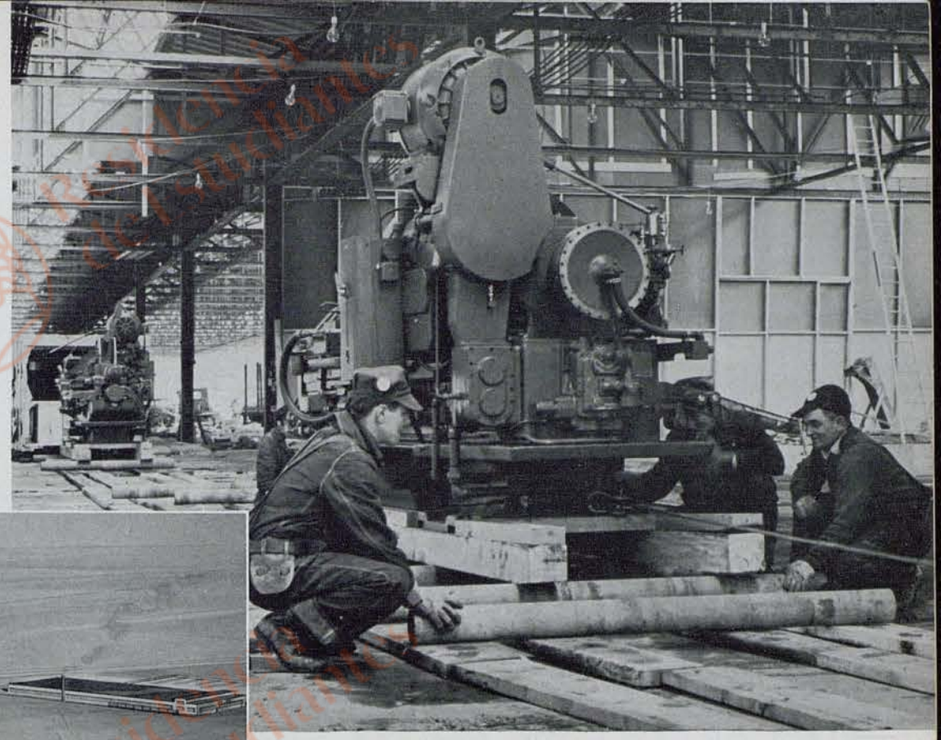
LESS THAN 10 MONTHS after the "go ahead" signal was given Wright Aeronautical officials, the first section of the mammoth Cincinnati machine and assembly building (shown below) was ready for the installation of machines. This building alone will cover 1,640,000 square feet and when it reaches full production in June, 1942, will have a monthly production schedule of 2,000,000 horsepower.

Wright Cincinnati Plant Takes Final Form

TWENTY MILLION POUNDS of structural steel is being riveted into place at the Cincinnati plant by steel workers such as these. In order to move this structural steel into the plant more than a mile of temporary railroad track was built inside the factory.



AN ARTIST'S CONCEPTION of the huge Cincinnati plant when it is in full production next year is shown above. The main building will house the machine shop and assembly departments. The T-shaped building in the foreground has been laid out for office space. Seventy-two test cells are directly behind the machine shop. In the upper right hand corner can be seen the new line production foundry for the casting of aluminum.



PART OF THE 12 CARLOADS of machine tools delivered to the Cincinnati division March 20 in anticipation of the production of parts for Wright Cyclone 14 engines within several weeks.

AN IDEA OF THE SIZE of the main building in the Cincinnati plant can be obtained from this photo of the structural steel. In order not to delay production, as each section is completed, plywood is used for inter-section partitions to protect machines and operators from the elements and from construction operations in the adjoining sections.

SUCCESSFULLY ELIMINATING EVERY DELAY within their power, Wright officials contracted for a Big Four locomotive to be moved into the finished first section of the Cincinnati plant to supply heat for the workers while the regular heating and air conditioning system is being completed.

CYLINDER HEADS will be produced in the 161,000 square foot aluminum foundry of the Cincinnati division shown above. The first casting is scheduled to be turned out April 15. Electric hoists, conveyor chains, overhead monorails, electric jaw crushers, motorveyors and chutes have been installed to accelerate manufacture of the heads for Cyclone 14's.

World's Largest Aluminum Cylinder Head Foundry Starts Production At Wright's Cincinnati Division

THE world's largest foundry for the casting of aluminum cylinder heads — its capacity greater than the combined output of the existing Paterson and Fairlawn foundries— is going into operation at the new Cincinnati Division of the Wright Aeronautical Corporation. Wright Aeronautical has the distinction of being the only aircraft engine manufacturer in the United States to operate its own foundries for castings of this type.

As automatic as human ingenuity can make it, the new foundry improves all hand operations which can be bettered by mechanical methods. From the time the sand for the moulds is dumped into hoppers at a private railroad siding until the cylinder head is ready for final machining, every step will be executed on a straight line production basis.

Electric hoists, conveyor chains, overhead monorails, electric jaw crushers, motorveyors, and chutes have been installed to accelerate manufacture of the cylinder heads for the powerful Wright Cyclone 14 aircraft engines which will be produced at the rate of 1,000 a month when full production is reached at the Cincinnati Division.

These innovations are the result of 25 years of experience in foundry technique dating back to the early days of World War I when the company had to become self-sufficient because of the extreme difficulty in obtaining and transporting cylinder heads from Europe.

Finning Aids Development

Forced on its own, the Wright Aeronautical Corporation began experimenting with sand moulds. Through constant refinement of its methods the foundry has gradually evolved from a production bottleneck to a department whose efficiency has reduced waste on all castings from 50 per cent to less than 5 per cent.

Over a period of two and half decades, the increasing skill of the foundry workmen has resulted in finning as deep as three inches and as thin as sixty-four thousands of an inch. These cylinder head fins have been vital in the development of an air-cooled engine, for the increase in the cooling area has permitted greater horsepower, efficiency and longevity.

A new system of handling the sand has been included in the layout. This consists of electrically operated monorails extending from the sand bins to any one of four electrically operated skip hoists which are a part of the sand mixing equipment. The sand will be carried in dump buckets with a multiple number of buckets on a train, thus allowing one operator to stand in the bins loading cars and a second operator at the skip hoist several hundred feet away to unload them.

Sand cores for the cylinder heads will be made on seventy-two individual brass patterns shaped to conform to the exterior of the head. The interior of the dome and the rocker boxes are formed by separate cores which are fitted together before pouring. Simultaneous operation of these moulds will produce enough cores to feed two conveyor ovens capable of baking 1,400 complete cores daily. Each of these ovens is equiped with a 1,200 foot conveyor for the continuous movement of the sand cores from the benches throughout the baking operation.

After the cores have been baked for several hours they are allowed to cool in especially designed cooling

loops, after which they are minutely inspected, cleaned and sprayed. After the spraying, they again go through a conveyor type drying oven which dries the spray and the paste required in this operation. Then they are stored on roller bed conveyors which automatically move up the cores to set-up benches for assembly.

The assembly operation, the most delicate in the foundry, consists of inserting the internal parts between the two halves of the fin body and the subsequent addition of the slab core which distributes the molten metal into four parts of the head simultaneously.

Sand is Reclaimed

The moulds are moved on roller-bed conveyors to the pouring zone which is completely hooded and exhausted of all fumes. The melting is accomplished by twelve 1,000 pound tilting type furnaces of the same general design as those used in the Fairlawn and Paterson foundries.

Other features entirely different than anything previously designed for an aluminum foundry are the shake-out system and sand reclamation process. After the castings are removed from the sand, wire, refuse and sand are put through two large electrically driven jaw crushers, after which the metal is removed by means of a magnetic pulley and returned to the floor level for sorting of the wires and nails which are salvaged for re-use in the core shop.

The sand is elevated to a large sixty-ton bin and fed by gravity through a series of screens and elevators to a rotary kiln. The temperature is reduced in an especially constructed cooler and sand coming from this cooler is now a pure white beach sand with all the oil, carbon, etc., completely removed. It is then classified by means of air into grain sizes and returned to the bins 800 feet away on a continuous rubber belt.

A new arrangement will eliminate floor trucks and large heaps of metal at the cutoff band saws.

The sand blast equipment will consist of two large multi-blast tables similar to those in use in Paterson and Fairlawn.

A complete redesignated heat treat process will replace, with two streamline conveyor ovens, the conglomeration of ovens, coolers and spare trucks under the old system. If the old batch type heat treat ovens and cooling chambers had been used, 14 ovens and cooling chambers would have been required.

One man loads the heads and the conveyor moves intermittently through a series of zones which brings the heads up to heat, gives them the required time for their solution treatment, automatically brings them into a high velocity air quench and then reheats them for their aging treatment.

A few of the high lights with reference to the construction of the building are (1) the ventilation system which supplies up to 1,000,000 cubic feet of air per minute; (2) the forty ton refrigeration plant for the cafeteria and offices which will maintain those areas at a predetermined temperature the year round; and (3) the lounge room which will allow the men room and comfort for eating their lunches and relaxation before or after their working periods.

Wright Trains Men

(Continued from Page 7)

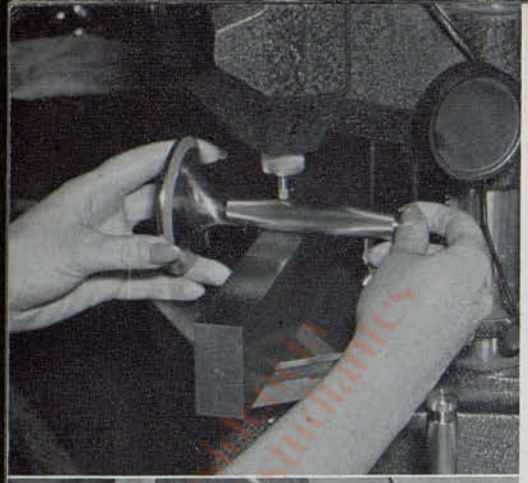
of the incompetent learners at the start.

If the learner passes tests at the end of the week, he gets his first chance at a machine tool. On a machine used in actual production, he is drilled for three weeks by Wright instructors. Then, once more, he is tested, rated for mechanical precision and assigned to a specific type of machine. On the basis of jobs available, he is notified when to report for work.

He still has, however, a lot of training ahead of him when he reports. The shop foreman assigns him to a machine. For a period of from two to fifteen weeks, he works beside a specialized worker, usually a veteran, until he is competent to go "on his own."

When national defense needs called for construction of the Ohio plant, the company had to find 12,000 new employees and 84 percent of them had to be skilled or semi-skilled. The Wright Aeronautical training program was transferred to Ohio.

A SEEMINGLY NEVER-ENDING STREAM of concrete was poured by workmen such as these to cover the huge floor area of the new Cincinnati division foundry. The plant will produce sufficient cylinder heads for the manufacture of 1,000 Cyclone 14's per month when full schedule is reached.



THE SUPPLENESS AND DEFTNESS of feminine fingers is needed in testing jobs of this type. These well groomed fingers are duplicated by the hundreds in vendor's inspection where parts supplied by outside manufacturers are given their primary testing.

Feminine Fingers Fly In Defense As Girls Inspect Engine Parts

FEMININE fingers as supple as a surgeon's and deft as a sculptor's are playing a most important role in the National Defense program—for in their sensitivity lies the fate of American aviators, their crews and thousands of civil passengers. Tens of millions of engine pieces will pass through these fingers for inspection this year before becoming a part of the Wright Cyclone and Whirlwind aircraft engines so vital to the defense program.

Young women in vendor's inspection—as the department is called—are responsible for the primary testing to tolerances as close as five ten-thousands of an inch of the parts supplied to the company by outside manufacturers.

Typical American Girls

Clad in their blue starched cotton uniforms with white collars and cuffs, the more than three score girls have the appearance of students in a large class as they work at individual benches extending in rows across the light, airy room.

The girls are similar to those found in any large American office force—young, eager to learn, and immaculate. Conscious of the importance of their job, they work hard, but they also find time for play. Take as an example one girl who in her time off studied flying and became a licensed pilot. This year she took her vacation in the winter so that she could fly to the Miami All American Air Maneuvers.

Every day more than 105,000 parts pass through these young women's fingers, 630,000 parts a week, 32,760,000 parts in a year—truly a staggering figure.

Checked To Thousandths

Vital parts of the engine—valve guides, valve seats, rocker rollers, roller pins, ball sockets, push rods, ball ends, adjusting screws, rocker hub bolts, studs, screws, nuts, bolts, valve tappet rollers, valve spring washers, locks and connections—are all primarily inspected by these women workers in defense.

When it is considered that the majority of the parts must be correct up to five thousandths of an inch, some idea can be gained of the skill required. But inspection in this department is not wholly dependent on the fingers, hands, and eyes

NO, THIS IS NOT A SCHOOLROOM. These young women in their trim blue starched cotton uniforms with white collars and cuffs are inspecting some of the 105,000 parts which pass through their fingers daily. More than 630,000 parts a week, 32,760,000 parts a year, receive their first testing by these attractive girls in vendor's inspection.

of these women. Machines, calibrated to the ten-thousandth of an inch (a human hair is three one-thousandths) also play their part.

Hardness testing machines, go and no-go gauges, visual tests, and magnetic type inspections are used to insure extreme exactness in the parts supplied to the Wright Aeronautical Corporation by vendors.

Set to their limits, the inspection machines do not falter and parts which do not meet with the precision tolerances demanded by Wright Aeronautical are rejected to be reworked or permanently discarded.

Machines Checked Often

However, it is realized that even these accurate machines may get out of adjustment and at frequent intervals—on some machines six times a day—expert checkers test the equipment.

Master plugs and gauges are tested by using Johansson blocks, and Rockwell test blocks are used to keep the hardness machines up to WAC standards.

There are no "easy" jobs in vendor's inspection. Every one is of difficult nature, due to the closeness of limits and tolerances. The reading of the visual indicators, Rockwell hardness machines, and the setting up of plate indicators are all highly specialized types of work performed by these girls.

With the emphasis on National Defense the vendor's inspection department has grown in proportion to the rest of the plant. Where only a handful of girls worked at the outbreak of the present war, sixty-eight are now employed.

These girls are also aided by 36 young men who work out the second and third shifts because the New Jersey State Employment Laws restrict women from working before 7 o'clock in the morning and after 12 midnight.

Vendor's inspection forms a small but vital part of the extensive inspection operations in the plants of Wright Aeronautical. Some idea of the importance of this department can be obtained from the fact that more than 50,000 inspections are necessary for the production of a single Wright Cyclone 14.

A WOMAN WORKER IN DEFENSE inspecting push rod ball ends for powerful Wright Cyclone and Whirlwind aircraft engines. In the sensitivity of her fingers lies the fate of American aviators, their crews and thousands of civil passengers.

THIS YOUNG WOMAN—one of the 68 just like her in vendor's inspection—is checking the pitch diameter of ground thread studs with a special two-dial indicating gauge. She realizes the important role she is playing in the defense program in a job where woman's skill is essential.

HORACE G. PRALL

JOHN T. WETZEL

Prall Appointed Budget Division Head; Wetzel Becomes Ass't Service Manager

HORACE G. Prall II, formerly assistant service manager, has been appointed manager of a newly created budget division in the Sales & Service Department of Wright Aeronautical Corporation.

Mr. Prall graduated from Stevens Institute of Technology in Hoboken sixteen years ago and has put in fifteen of the intervening years with Wright Aeronautical Corporation.

Taking his M. E. in 1925, he worked for six months as a student engineer in the Mack Truck Company in Allentown, Pa. He has a fond memory of that job—they let him test run new fire trucks. Then he joined WAC in January of 1926.

He was married in 1936 and now lives in Ridgewood, where he has enough ground around the house to follow his hobby of horticulture. The Prall's have a three-year-old daughter, Virginia, who pulls up her father's flowers but she is the only one who can touch them.

Mr. Prall also plays squash and is a baseball fan.

"Duke" Prall was assistant service manager from 1935 until this March, when he was made manager of the budget division. His only regret about his career in the aircraft engine field is that WAC doesn't need a good man, now and then, to test run a new fire truck.

JOHN T. Wetzel, newly-appointed assistant service manager, has a hobby—woodworking—but in the ten years he has been at Wright Aeronautical his hand tools and lathe have had to take a back seat.

When he is not directing the activities of the service men in Sydney, Australia, Wake Island in the Pacific, or Calcutta, India, "Jack" Wetzel is speaking before civic and professional groups about the merits of Wright Cyclones and Whirlwinds.

Starting out in the structural steel business (he helped build the George Washington Bridge), Mr. Wetzel has travelled a long way from the small West Virginia town of Holden where he was born three days after Christmas in 1906.

After attending high school, he spent two years as a cooperative student in aeronautical engineering at Beckley College in Harrisburg, Pa. He then took an extension course in structural engineering and spent several years in the Bethlehem Steel Company's training school.

In June, 1931, Mr. Wetzel came to the Wright Aeronautical Corporation and has been in the service division since that time.

Mr. Wetzel lives in Ho-Ho-Kus, N. J. with his wife (a well known concert singer) and his six-year old son.

Cincinnati Plant Ready

(Continued from Page 9)

dent of Wright Aeronautical Corporation and Curtiss-Wright Corporation, drove a massive bulldozer over the former farm land and broke out the first scoopful of dirt.

Out of all this effort in the less than ten months that have passed since the first meeting in Washington has come the world's largest aircraft engine factory.

In the plant will be made only one type of engine, the Wright Cyclone 14-cylinder engine that develops 1700 h. p. With one engine type and with the entire plant designed and tooled for mass production, the output will reach 2,000,000 h. p.

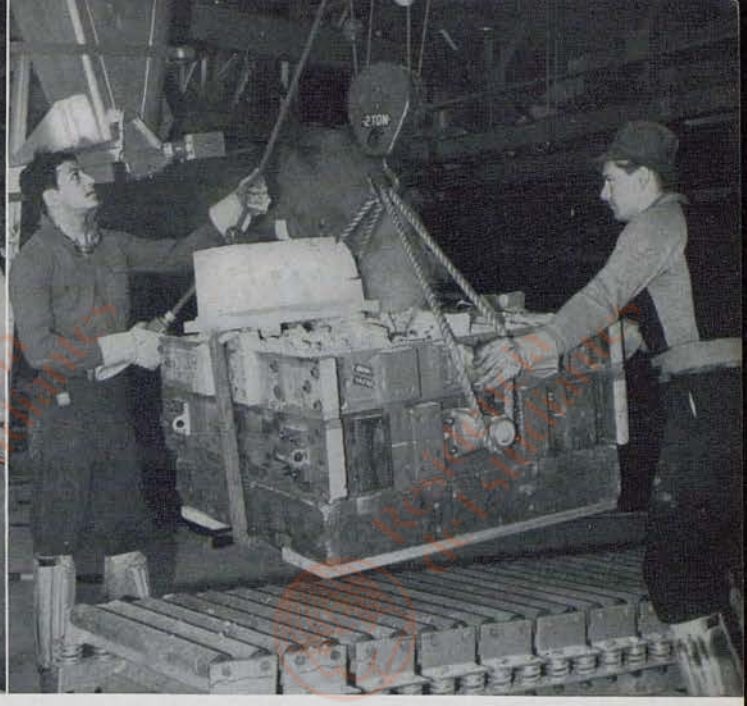
At Cincinnati, where production will be standardized on a single model, the "in-line" principle of mass production and the use of newly designed multiple-tooling machinery will be applied on a major scale.

The Cincinnati plant covers a total area of 2,120,000 square feet. The machine shop and assembly building is 1,640,000 square feet in area. The aluminum foundry covers 161,000 square feet, the magnesium foundry 118,000. Test cells occupy 116,000 square feet, the office building 74,000 and the power house 11,000 square feet.

The contract for the main construction was let to Frank Messer & Sons, on December 14, and the company started work twelve hours later. Other contracts were let for structural steel, masonry, roofing, roof tiles, glass, doors, metal partitions, paint, plumbing, cafeteria equipment, electrical fixtures, soundproofing, test cells, boilers, office furniture and a host of other items.

Despite the size of the project, its construction was so rapid that on March 24 the first machine tools were installed. This was exactly 152 days after ground had been broken last October 23.

Machine operators are being supplied at Cincinnati through six training projects as well planned as the Wright expansion and which will provide men faster than machines are available. More than 1,500 have already gone to work. By July of 1942, more than 12,000 persons will be employed in the plant.



ABOUT 150 DIFFERENT MAGNESIUM PARTS used in the production of Wright Cyclone and Whirlwind engines are being manufactured in the new magnesium foundry of Wright Aeronautical at Fair Lawn, N. J. The workers at the left are pouring molten magnesium into a mould to produce the rear section cover plate of an engine. At the right an operator is lowering the completed casting on an automatic shaker.

Wright Opens World's Largest Magnesium Foundry; First One Devoted Solely to Aircraft Engine Castings

USING the metal that grew up with the aircraft industry, the Wright Aeronautical Corporation has made another advance in the production of aircraft engines by building the first foundry designed solely for magnesium alloy castings.

In a strikingly modern building of concrete, steel and glass in Fair Lawn, New Jersey, the foundry is housed. From it pours a steady stream of magnesium castings of all shapes and sizes. It is these castings that permit savings of vital pounds in the weight of Wright engines, for magnesium is one-third lighter than aluminum and yet in alloy form is strong enough for engine parts.

Magnesium's Properties

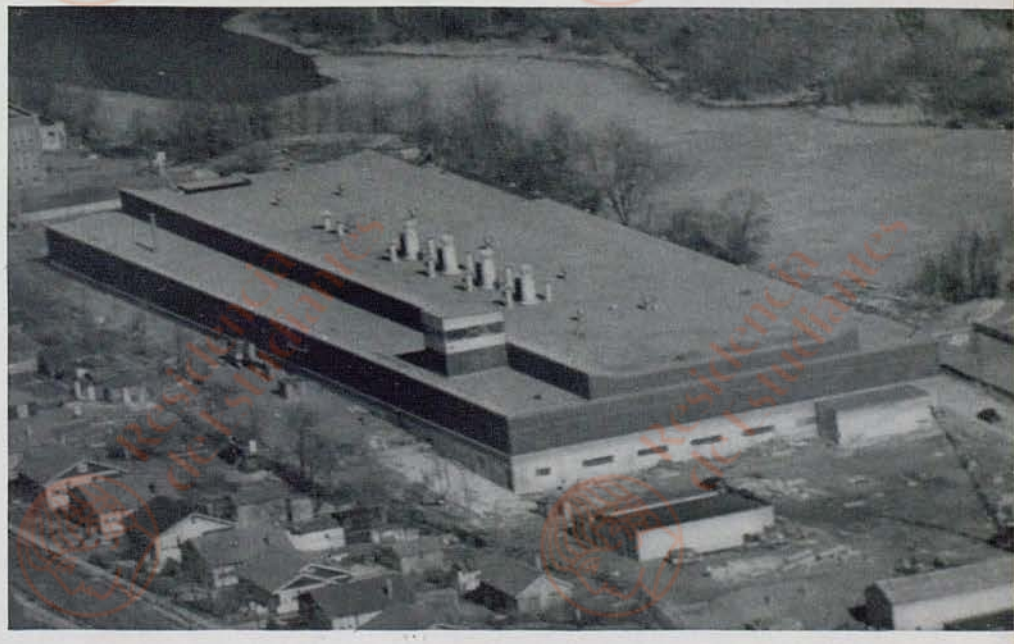
A quarter of a century ago magnesium was not very important commercially. Its chief use in those days was for flashlight powder, always used for taking pictures of banquets and producing a blinding flash for a fraction of a second and a cloud of smoke for two hours. It also had a minor use in electrical products.

With the increase of aircraft production, and a rising demand for light and strong metal alloys, the research metallurgists turned towards magnesium and its compounds. The technicians soon ran head-on into the metal's temperamental qualities.

In molten state, magnesium has the unpleasant habit of bursting into flame if it comes into contact with air. It is also a friendly, sociable metal, mixing with gases and other metals in truly democratic fashion but ruining its own purity in the process.

These and other problems were slowly solved by burning up count-

IN THIS MODERN FOUNDRY of the Wright Aeronautical Corporation magnesium parts are being produced, lighter than aluminum and yet in alloy form strong enough for engine parts.



less batches of magnesium and ruining thousands of castings, a procedure that is not at all unusual in the field of metallurgical research. A powdered flux was developed to sprinkle on top of the liquid magnesium and prevent pyrotechnics; the burning flux forming a protecting film between the metal and the air. Exact temperature controls were used to prevent the absorption of gases while being melted.

Wright Aeronautical used its first magnesium castings in 1924. A magnesium section was added to regular foundry facilities, to stay there until the expansion program necessitated by World War II came along. Then Wright Aeronautical built its own magnesium foundry, the first aircraft engine company to have a separate foundry devoted just to such production.

20,000 Pounds A Day

Although several other such plants are being constructed, the Fair Lawn plant is at present the biggest magnesium foundry in the United States. It can turn out 20,000 pounds of magnesium castings a day, while only a few years ago, before the present war emergency, the entire production of magnesium for all uses in the United States was only about 2,000 tons annually.

The Fair Lawn foundry is 700 feet long, 200 feet wide, fireproof and ultra-modern in design. Its design has one purpose: line production of magnesium castings.

The foundry makes about 150 different magnesium parts. They include nose and rear covers, supercharger covers, intake manifolds, cylinder block cover, oil sumps, breathers for oil systems and numerous other small parts.

The raw materials—ingots of virgin metal and sand for the moulds and cores—enter one end of the building. Smoothly and steadily, without delay or jam, the materials flow their separate ways on conveyor systems, to meet when the metal comes from the furnaces and is poured into the waiting moulds of sand.

Sand is used for moulds and cores. The mould is the bulk of sand hollowed out to form the external shape of the casting. The "core" is a form of baked sand inserted in the "mould"; its bulk stops the flow of metal and forms the internal space in the finished casting.

Use Sand Again

Mould sand, known as "green" sand, can be used over and over, with enough new sand added to bring it up to standard. The cores are not reclaimed. At the shake-out point, where the sand is broken away to expose the finished casting, the green sand is sifted through a screen and drops into the basement, where it is processed for re-use and placed on a conveyor system for a long ride back to the moulding benches.

Trade Winds

Reg. U. S. Pat. Off.

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WRIGHT AERONAUTICAL CORPORATION

Paterson, N. J., U. S. A.

Finished castings, freed of sand, go to a bandsaw table, where excess metal is sawed off. About two-thirds of a casting is excess metal. This metal is not wasted, however. Like the green sand, it goes for a conveyor ride back to the starting point, is re-melted and used with new metal in another casting.

Aiding in this process of casting are all the mechanical devices—conveyor systems, hoists, electric furnaces, drying ovens and shake-out machines—that Wright engineers could devise to speed line production.

For example, sand from storage bins is hoisted up to the highest point in the building by automatic bucket conveyors. It is mixed with oil and water, then it drops through chutes to the small cars of an elevated narrow-gauge railroad running out over the benches of the men who make cores and moulds. From the narrow-gauge cars, it is dropped into the individual bins of the coremakers. When they need a new batch of sand, they pull a handle and a shower of sand drops onto their bench. In all that process, the sand is lifted only once, from basement to mixers near the roof. In every other operation, it moves by gravity and no core-maker has to lift even a shovelful of sand.

Conveyors Save Time

When the cores are finished and ready to be baked—to harden them so they will not break under the strain of pouring—another conveyor system saves time and energy. A continuous line of drying racks moves past each coremaker's bench and then through the ovens. After baking for eight hours in the ovens, the cores are coated with a compound to harden vital stress points, then bake another hour.

The pouring is the high spot of the show over in Plant No. 3. It's the touchy part, where the molten mass may go up into flames. The fact that such a fire hasn't occurred in years is due in large part to the skill of the men who handle the skimmers and the flux cans. The skimmer is an iron hook to scrape slag; the flux can is a shaker like those used in bakeries to sprinkle powdered sugar over doughnuts.

Men Handle Crucibles

But this powder is not for decoration. It is a combination of sulphur and borax, to prevent the melted magnesium from burning. At every point where the liquid comes out from under its covering of slag and into the open air. the flux man is ready, sprinkling out a handful of powder.

The pouring is the only spot in the foundry where mechanical equipment has been dropped in favor of man-power. Reason is that quite a few moulds can be poured from one crucible and the three men handling a crucible can move it from mould to mould faster than a monorail connection could.

Purely Personnel

CASUAL CLICKS BY K. J. B.

ANDREW J. BURKE, pilot for Lockheed Aircraft Corporation, who has been flying many of the Cyclone-powered Lodestars on their delivery flights to the British.

MAURINE ROBERDS, Hostess for Braniff Airways, Inc. takes a moment off to join the Aviation Rogues' Gallery while enroute from Oklahoma City to Dallas.

DR. BAILEY W. OSWALD of Douglas Aircraft, who read an excellent paper at the Airline Maintenance Meeting held at Brownsville early in February.

LOWELL YEREX, President TACA Airlines of Central America who was a recent visitor to New York and vicinity checking into procurement of some new equipment.

ROY KEELEY of Waterman Airlines, Inc. whose company has applied to CAB for certificate of convenience and necessity to operate from New Orleans to Puerto Rico.

ARTHUR W. STEPHENSON of Seaboard Airways, Inc., whose company has applied for certificates to operate service from Boston to Miami and New Orleans.

C. E. "JACK" SHEALER, Shop Superintendent of PAA's Western Division, at Brownsville, snapped at the recent Air Transport Association's Airlines Maintenance Meeting.

ALTA M. TAYLOR, Hostess for Transcontinental and Western Air, wonders if the camera is going to play a trick while enroute from New York to Kansas City.

GEORGE H. ROERIG, Assistant Operations Manager of Eastern Air Lines, snapped in the Great Silver Fleet's attractive Miami Terminal at 36th St. Airport.

Exhaust Fumes

Groom: "How did you make this cake, dear?"

Bride: "Here's the recipe. I clipped it from a magazine.

Groom: "Are you sure you read the right side? The other side tells how to make a rock garden."

* * *

A hypochondriac consulted a doctor for a thorough check-up. After going over the patient carefully, the doctor inquired as follows:

"Do you drink?" Reply was, "No Doctor."

"Do you run around nights?" Reply was, "No, Doctor."

"Do you swear excitedly?" Reply was, "No, Doctor."

Thereupon the doctor inquired if his patient felt pain on each side of the head.

"Yes, Doctor, I do," was the reply.

"Well, my good man, your only trouble is your halo is too tight," concluded the doctor.

* * *

"I wonder why there are so many more auto wrecks than railway accidents?"

"That's easy. Did you ever hear of the fireman hugging the engineer?"

* * *

Bill: "Have you ever realized any of your childhood hopes?"

Pete: "Yes; when mother used to comb my hair I often wished I didn't have any."

* * *

Perhaps you haven't heard about the mama kangaroo who took her two little babies out of her pouch, banged their heads together, and shouted, "How many times do I have to tell you to stop eating crackers in bed?"

* * *

Bell Hop: "Call for Mr. Popkanoskovitch. Call for Mr. Popkanoskovitch!"

Mr. Popkanoskovitch: "Vat's the initial, plizz?"

* * *

He: "I hear the church you go to is very small."

She: "Yes, every time the preacher says, 'Dearly beloved,' I feel like it's a proposal."

"I don't think that man upstairs likes to hear Georgie play his drum, but he's certainly tactful about it."

"Why?"

"This afternoon he gave Georgie a knife and asked him if he knew what was inside the drum."

* * *

"Jack has given up smoking."

"How did he manage it?"

"Knocked out his pipe on a gasoline pump."

"Wasn't the Washroom Here Yesterday?"

A man and his wife were suffering from seasickness, while their young son seemed to be enjoying the situation. Finally the mother mustered courage and voice enough to say: "John, I wish you would speak to Willie."

The father, unable to lift his head, said feebly:

"Hello, Willie."

* * *

"They all laughed when I stood up at the night club. How should I know I was under the table?"

The owner of a cheap watch brought the timepiece into the jeweler's shop to see what could be done for it. "The mistake I made, of course," he admitted, "was in dropping this watch."

"Well, I don't suppose you could help that," the jeweler remarked. "The mistake you made was picking it up."

* * *

Notice in a Scotch church: "Those in the habit of putting buttons instead of coins in the collection plate will please put in their own buttons and not buttons from the cushions on the pews."

* * *

And then one day she turned and saw that he was smiling at her! She smiled back at him! No, he didn't turn away, he didn't disappear—he looked at her more intently than before!

"Smile like that again," he said.

She blushed and dimpled. And he laughed and laughed.

"Just as I thought," he said. "You look like a chipmunk."

* * *

"Aren't those chimes beautiful? Such harmony! So enchanting!"

"You'll have to talk louder. Those blasted bells are making such a racket I can't hear you."

* * *

Bishop: "But how on earth did you manage to keep the cannibals from eating you?"

Returned Missionary: "It was easy. You see, I have a cork leg. As soon as I landed I pulled up my trousers, cut off a slice and gave it to the chief. He decided I wasn't worth cooking."

* * *

Burglar: "Get ready to die. I'm going to shoot you."

Victim: "Why?"

Burglar: "I've always said I'd shoot anyone who looked like me."

Victim: "Do I look like you?"

Burglar: "Yes."

Victim: "Then, for God's sake, shoot."